



**EUROPEAN COMMISSION
DG RESEARCH**

**SIXTH FRAMEWORK PROGRAMME
THEMATIC PRIORITY 1.6
SUSTAINABLE DEVELOPMENT, GLOBAL CHANGE & ECOSYSTEMS
INTEGRATED PROJECT – CONTRACT Nr. 031315**



CityMobil

**Administration and coordination of the Castellón
demonstration (Compiled document)**

Deliverable no.	D1.4.1.2-D1.4.1.3-D1.4.1.4
Dissemination level	Public
Work Package	WP1.4.1 Demonstrator project management
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Status (F: final, D: draft)	Final
File Name	D1.4.1.234-PU-CityMobil- Annual reports Castellon demonstrator-FINAL
Project Start Date and Duration	20 May 2010 - 30 April 2011

Executive summary

The main objective of the CityMobil project is to achieve a more effective organisation of urban transport, resulting in a more rational use of motorised traffic with less congestion and pollution, safer driving, a higher quality of living and an enhanced integration with spatial development.

In order to achieve these objectives 5 subprojects have been defined and developed throughout the CityMobil. The first one of these sub-projects (SP1) is especially dedicated to test, validate and demonstrate the advanced concepts and tools developed in the project in a number of different European cities under different circumstances. For this purpose three large-scale demonstrators have been set up, where implementations of real and innovative systems will be executed. These three big demonstrations will be performed in Heathrow airport, Rome and Castellón.

This deliverable is part of SP1 and reports the status of the Castellón Demonstrator, trying to explain the administrative and technical management procedures performed to develop and implement the Demonstrator.

This deliverable was planned to be a yearly document in which the progress of the year in Castellón demonstrator was going to be reported. Due to the delay in the preparation of this document, this periodicity could not be met and the consortium has agreed to combine documents 2, 3 and 4 into a unique compiled document.

This document is structured into 5 sections. The first two sections will show the description of the Castellón Demonstrator and the initial management plan agreed at the beginning of the project. On the other hand sections 3 and 4 show the actual development of the Demonstrator and the actions taken by the consortium to try to shorten the delay in the preparation of the corresponding deliverables. Last but not least, the last section of the document shows the actual status of the demonstrator and the next steps to be followed to develop the remaining work in Castellón and WP4.1

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Introduction

The Castellón demonstrator, which is the object of this document, is (together with Rome and Heathrow) one of the three large demonstrators to be developed during the CityMobil project. The main goal of this project is to achieve a “more effective organisation of urban transport resulting in a more rational use of motorised traffic with less congestion and pollution, safer driving, a higher quality of living and an enhanced integration with spatial development”.

To achieve this main goal, during the project, several integrated traffic solutions will be developed, for example: advanced concepts for innovative autonomous and automated road vehicles for passengers and goods; solutions that will try to provide mobility in an efficient, safe and economic manner.

The CityMobil project will demonstrate and validate these solutions in several European cities, with two kinds of demonstrators: small scale demonstrators and large scale demonstrators. Both types of demonstrations are studied in the first one of the five subprojects in which CityMobil project is structured:

- SP1 Demonstrations and City Studies
- SP2 Future Scenarios
- SP3 Technological Issues
- SP4 Operational Issues
- SP5 Evaluation

The next section will try to explain the characteristics and features of the Castellón demonstrator.

1 Castellón demonstrator description

During the project development several demonstration activities will be performed. These demonstrations will serve as a laboratory for developing and evaluating the different solutions proposed during the project. Among these demonstration activities, three large scale demonstrations will take place in Rome, Heathrow airport and Castellón.

The main objective of Castellón large scale demonstration is to implement a hybrid transport system. This system is segregated from normal traffic by the use of a reserved platform and will be electric and automatically driven when circulating through the platform, although it will be possible to be non electric and manually driven when needed.

The Castellón demonstrator in CityMobil is connecting the university and the city centre in Castellón. The demonstrator will be part of a much bigger project that will connect in the future several cities – such as Benicassim, in the seaside, Almassora or Vila-Real - with the city of Castellón.

1.1.1 System Description

As shown in the figure below, the proposed system - in which CityMobil demonstrator is integrated - is structured around two corridors, with more than 40 kilometres, in which a reserved platform for the public transport vehicles will be built. On this platform a hybrid system of guided trolley bus will be used. This system has been selected to combine the cargo capacity, accessibility, speed and regularity of a railway based solution with the flexibility, adaptability and smaller costs of a road based system. The vehicles will run on a reserved platform, although in some stretches of the itinerary they will circulate on shared infrastructure. At intersections, the bus will be given priority over the private traffic. The vehicles to be used will be hybrid vehicles with electrical traction and an automated optical

guidance system to assure the greatest accessibility at the stops and to allow the circulation and operation in sections where they will have to share the roadway with the private vehicles.



Fig.1 Area map with planned system trajectory

This transport system will provide considerable flexibility in operations. A suitably adapted bus/tramway could travel on a guideway where this is available but could also travel on any other part of the road network as required, something especially useful in the city centre, so the guided transport system to be implemented in the demonstrator provides a lower cost alternative to light rail while having the advantages of dedicated rights of way.

The next figure shows an example of the structure of the dedicated lane and how it makes use of the space available.



Fig.2 Example of a stretch of the dedicated lane segregated from the normal traffic

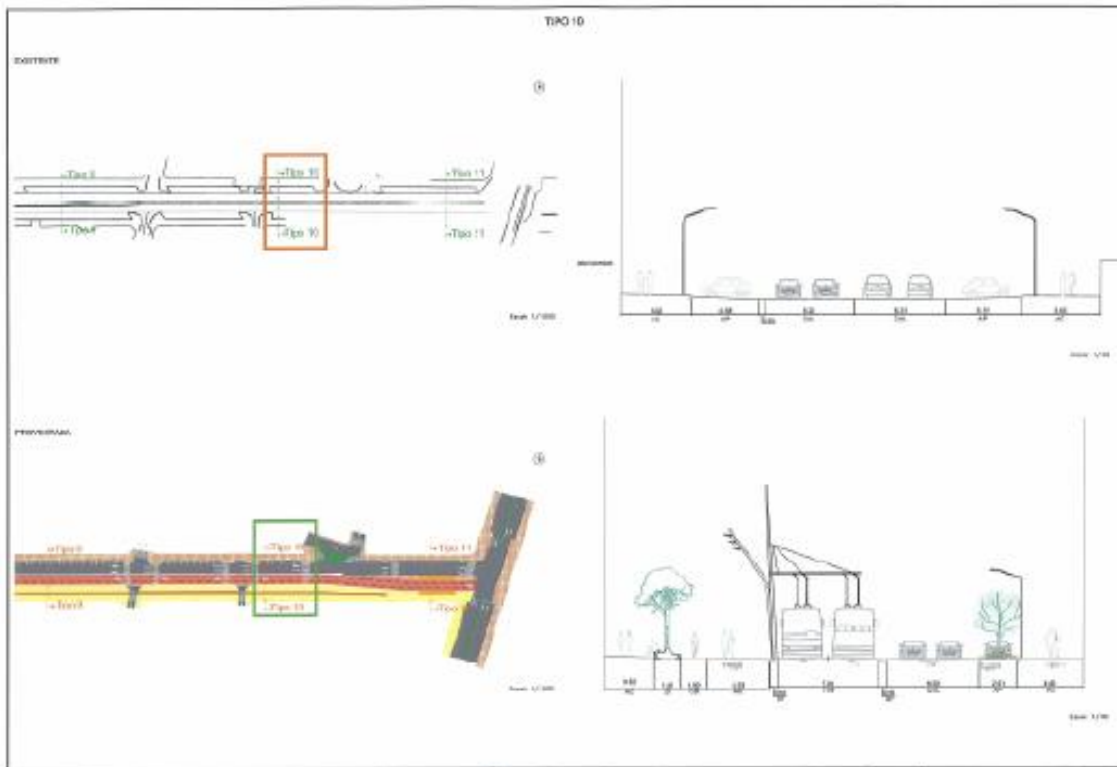


Fig.3 Road cross section and use of space.

Guided vehicle systems involve taking the steering of the bus away from the bus driver for all or, as in the case of Castellón, part of the route. In doing so, they eliminate the need to allow for any lateral movement of the bus within a lane of traffic. A bus is generally approximately 2.5 m wide, but a bus lane is usually 3.75 m or even 4 m wide to allow for this lateral movement. A guided bus system, therefore, provides opportunities to implement dedicated busways where road space is in short supply and, hence, where conventional bus lanes could be impractical. Furthermore, it also provides opportunities –by means of automated docking- to improve physical access to the bus by minimising the vertical and horizontal gaps between the bus stop and the bus. In the case of Castellón demonstrator the dedicated lane is only 3.5 m width.

The Castellón demonstration will make use of electrical traction vehicles with guidance systems to circulate over a reserved platform. The vehicles will be powered through a tramway catenary, having in addition another secondary power supply system –possibly battery based- to be used in the historical centre of the city, where it is not possible to have an aerial power supply system.



Fig.4 Electrical traction vehicles used in Castellón

1.1.2 Site Description

The first line of the advanced transport system – northern corridor - will provide service to the University Jaime I, the historical centre of the city, the important settlements in the seaside and the beach in Benicàssim, an important tourist resort located 20 kilometres north. The layout of this line will connect therefore the main centres of mobility: University, Intermodal

Station, historical centre, commercial centres, Port and beaches. The Castellón CityMobil demonstrator will be included in this part of the project, more concretely it will cover the stretch connecting the University and Castellón city centre. In a second phase, a second line – southern corridor- will also connect the south of the metropolitan area (Almassora, Vila-real, Burriana).

The next figure shows an outline of the demonstrator route from the city centre – right-down side of the figure – to the University Jaume I campus – left-up side of the figure -:

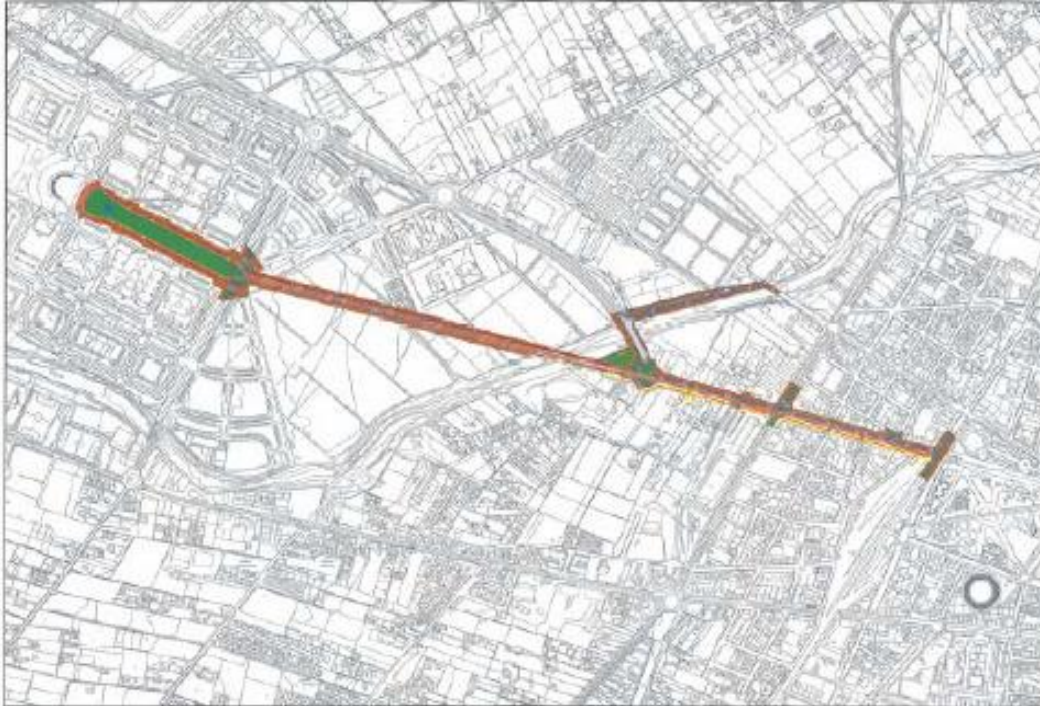


Fig.5 Demonstrator trajectory

2 Initial management plan of the Castellón Demonstrator

The Castellón demonstrator is one of the three big demonstrators of the CityMobil project, and it is included in the first Sub-Project of CityMobil.

In order to tackle the work of this demonstrator, 8 work packages were defined at the beginning of the project, where the work was structured as follows:

- WP.1.4.1: Demonstration project management
- WP.1.4.2: Specifications and adaptation of vehicles
- WP.1.4.3: Design and implementation of IT-systems
- WP.1.4.4: Design and construction of infrastructure
- WP.1.4.5: Economical analysis and impact assessment
- WP.1.4.6: Operation, service and maintenance
- WP 1.4.7: Demonstrator data collection
- WP.1.4.8: User needs and awareness action

The timeline of these work packages is the following:

SP	Name	Year 1				Year 2				Year 3				Year 4				Year 5				
WP		Quarter	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1,4	Castellon demonstration																					
1.4.1	Demonstration project management																					
1.4.2	Specification and adaptation of vehicles																					
1.4.3	Design and implementation of IT-systems																					
1.4.4	Design and construction of infrastructure																					
1,4,5	Economical analysis and impact assessment																					
1.4.6	Operation, service and maintenance																					
1.4.7	Demonstration data collection for evaluation																					
1.4.8	User needs and awareness actions																					

These work packages and the work package 1.4 itself have several links among them and with other work packages and sub-projects of the CityMobil project. These links are shown and clarified in the next diagram.

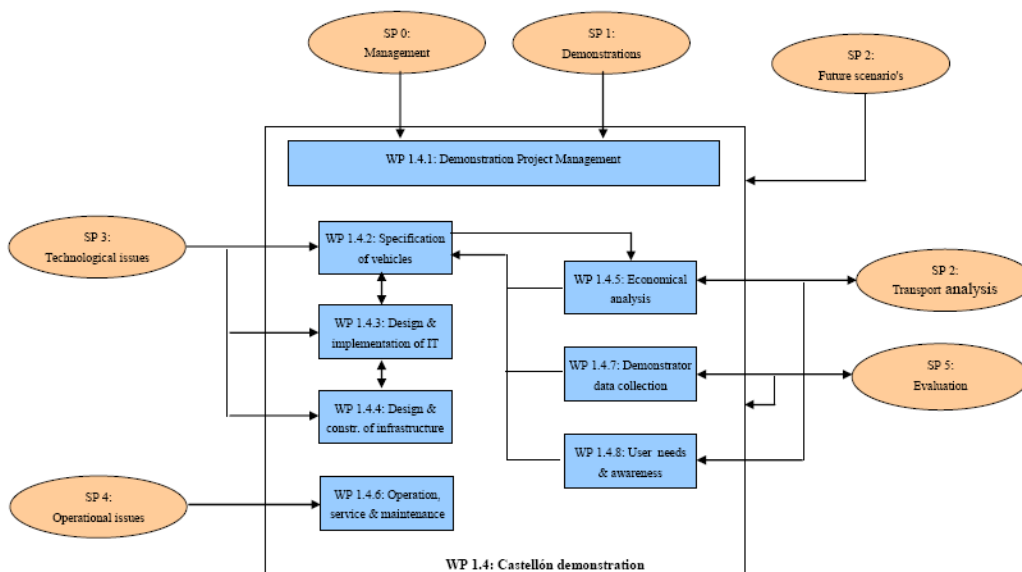


Fig.6 Castellón Demonstrator structure and links with other Sub-projects

2.1.1 WP1.4.1 Demonstration project management

This work package will coordinate the cooperation between the other work packages and have the administrative responsibility of the demonstrator.

The main objective of the WP 1.4.1 is to ensure efficient administrative, financial and technical management of the Castellón demonstrator. This work package will also be in charged of the organization of all the necessary work and legal issues for contract management in the demonstrator, and will carry out the overall technical management and execution of the project. It will closely follow-up the project progress, co-ordinate the quality assurance functions, provide continuous risk assessment and in case of problems, it will initiate the required corrective actions in co-operation with the concerned partners.

The main activities of this work package can be summarized in the following activities:

- Monitor the technical progress of the work and the agreed deadlines and milestones of the time planning.
- Coordinating the Work package Leaders' work and lower levels of the management hierarchy, as can be Task Responsible.
- Anticipate potential critical situations and proposing solutions.
- Quality Control and packaging of the deliverables based on the reports that will be provided as result of the activities.
-

The work in this work package is structured in one task:

- T1.4.1.1 Technical and administrative management

The main outputs from this work package are the following deliverables and milestones.

Deliverables	Month due
D.1.4.1.1: Administration and Coordination of the Castellón demonstration	M12
D.1.4.1.2: Administration and Coordination of the Castellón demonstration	M24
D.1.4.1.3: Administration and Coordination of the Castellón demonstration	M36
D.1.4.1.4: Administration and Coordination of the Castellón demonstration	M48
D.1.4.1.5: Administration and Coordination of the Castellón demonstration	M60

Milestones	Month due
M.1.4.1.1: Demonstrator analysis and review of objectives	M18
M.1.4.1.2: Demonstrator analysis and review of objectives	M30
M.1.4.1.3: Demonstrator analysis and review of objectives	M42

2.1.2 WP1.4.2 Specification and adaptation of vehicles

The objective of the WP 1.4.2 is to specify the kind of vehicles to be used in the demonstration in Castellón. This WP consists of design, documentation and laboratory tests necessary for the adaptation and integration of automated buses/tramway in the demonstrator of Castellón. More detailed aims of the work package are to get solutions for the integration of the vehicle and IT technology, to find the necessary technologies of safety concerning the vehicles and prepare a plan for testing of critical vehicle components.

The work of this work package is structured into two tasks:

- T1.4.2.1 Specification of vehicles
- T1.4.2.2 Acquisition and adaptation of vehicles

The outputs settled for this work package are as follows:

Deliverable	Month due
D.1.4.2.1: Specification of vehicles	M12
D.1.4.2.2: Adapted vehicles	M18

Milestone	Month due
M.1.4.2.1: Selection of critical technical solutions	M12
M.1.4.2.2: Vehicles adapted and ready for the demonstrator	M18

2.1.3 WP1.4.3 Design and implementation of IT-systems

WP 1.4.3 will develop and carry out the design, implementation and testing of the IT-applications required in the Castellón demonstration. This work package is structured into three tasks:

- T1.4.3.1 Requirements definition
- T1.4.3.2 High level functional specification
- T1.4.3.3 Detailed design and prototype implementation

The work done in these three tasks will produce the following outputs:

Deliverable	Month due
D.1.4.3.1: High level specification including requirement specification	M12
D.1.4.3.2: Castellón exploitation support system including DS	M 26

Milestone	Month due
M.1.4.3.1: Technical documentation ready for the actual implementation	M26

2.1.4 WP1.4.4 Design and construction of infrastructure

The aim of WP 1.4.4 is to develop and build the infrastructure used by the vehicles in the Castellón demonstrator, including its integration with the environment.

The work package includes the selection of the best possible guideway alignment, the definition of the landscaping of the guideway alignment into the cityscape, the design of the stations and the planning and construction of the guideway.

This work package is structured into 4 different tasks:

- T1.4.4.1: Selection of the guideway alignment
- T1.4.4.2: Landscaping of the guideway alignment into the cityscape
- T1.4.4.3: Stations
- T1.4.4.4: Planning and construction of the guideway.

The outputs of this work package are as follows:

Deliverable	Month due
D.1.4.4.1: Design of dedicated lane infrastructure	M9
D.1.4.4.2: Infrastructure for the Castellón demonstrator ready	M26

Milestone	Month due
M.1.4.4.1: Preliminary engineering plans	M6
M.1.4.4.2: Analysis of the noise, emissions and landscape	M9
M.1.4.4.3: Infrastructure for the Castellón demonstrator ready	M24

2.1.5 WP1.4.5 Economical analysis and impact

The objective of this work package is to evaluate the socio-economical impacts of the Castellón demonstration and define an impact assessment framework. An impact assessment framework, tailored for the ex ante assessment, is specified on the basis of a literature survey and expert interviews. Economic aspects, level of service, environmental effects, social impacts, traffic safety impacts, impacts on land use and urban form, and impacts on image and the attractiveness of the area are included. After the implementation of the Castellón demonstration the indicators will be modified for the ex post assessment, which will provide knowledge and experience from the implementation phase.

The work of this workpackage is distributed in the following tasks:

- T1.4.5.1 Impact assessment framework
- T1.4.5.2: Ex-ante impact assessment of the Castellón demonstration
- T1.4.5.3: Ex-post impact assessment of the Castellón demonstration.

The outputs of this work package are as follows:

Deliverable	Month due
D.1.4.5.1: Impact assessment frameworks	M24
D.1.4.5.2: Ex-ante impact assessment of the Castellón demonstration	M36
D.1.4.5.3: Ex-post impact assessment of the Castellón demonstration	M60

2.1.6 WP1.4.6 Operation, service and maintenance

The objectives of this work packages are to specify the operation, service and maintenance requirements, to define educational needs for drivers including an education plan, to define the critical vehicle components and parts affecting maintainability and to be responsible for the operational activities of the demonstration (operation, service and maintenance).

- T1.4.6.1: Definition of the operation, service and maintenance requirements
- T1.4.6.2: Description of work tasks and educational plan
- T1.4.6.3: Contribution for the maintainability-related technical design of the IT infrastructure

The outputs of this work package are as follows:

Deliverable	Month due
D.1.4.6.1: Operation, service and maintenance plans	M32

2.1.7 WP1.4.7 Demonstrator data collection

This work package will try to define a concise set of data to assess different type of operation scenarios.

Within this work package the relevant data will be collected on the field, in order to assess different types of operational scenarios.

The work to be performed within this work package will be done in close co-operation SP 5, where all the data from CityMobil project will be analysed for conclusions.

Two tasks conform the work of this workpackage:

- T1.4.7.1. Data collection for the ex-ante analysis
- T1.4.7.2. Data collection for the ex-post analysis

The outputs of this work package are as follows:

Deliverable	Month due
D.1.4.7.1: Operation data collection for the ex-ante analysis	M32
D.1.4.7.2: Data collection for the ex-post analysis	M60

2.1.8 WP1.4.8 User needs and awareness actions

The objective of WP 1.4.5 is to evaluate the socio-economical impacts of the Castellón demonstration and define an impact assessment framework. An impact assessment framework, tailored for the ex ante assessment, is specified on the basis of a literature survey and expert interviews. Economic aspects, level of service, environmental effects, social impacts, traffic safety impacts, impacts on land use and urban form, and impacts on image and the attractiveness of the area are included. After the implementation of the Castellón demonstration the indicators will be modified for the ex post assessment, which will provide knowledge and experience from the implementation phase. The work in this WP will be complementary to and coordinated with SP5 cross site evaluation.

The analysis of the user needs and awareness actions have been compiled through focus groups.

The output of this work package is as follows:

Deliverable	Month due
D.1.4.8.1: Analysis of the user needs and preferences (pre implementation)	M12

Milestone	Month due
M.1.4.8.1: Initial focus group research results	M12
M.1.4.8.2: Pre implementation focus group results	M11

3 Actual development of the Castellón demonstrator

As mentioned above, the Castellón CityMobil demonstrator is part of a bigger transport plan in Castellón area and its surroundings. This Transport Plan is a key issue for the authorities in Castellón and the GVA, therefore their interest in constructing the system is beyond the project.

This strong commitment of the local authorities in the transport plan in Castellón was one of the main reasons that allowed the correct and efficient development of the Demonstrator. In fact the Castellón demonstrator has been built and developed with minor delays and it's been in operation and opened to the public since June 2008.

On the other hand, when it comes to the administrative matters, some deliverables in WP1.4 have suffered strong delays and could not be accomplished in due time.

Some corrective measures were applied by the consortium in order to tackle the situation – see section 4 for more details -, such as shifting the deliverable responsibility from GVA to other partners in the consortium or combining some WP1.4 deliverables. At the moment of the completion of these documents the status of the deliverables of WP1.4 is as follows:

- D1.4.1.2 / D1.4.1.3/ D1.4.1.4 → Combined into one document and assigned to ETRA
 - Status: completed
- D1.4.2.1 → Was assigned to ETRA
 - Status: completed
- D1.4.2.2 → Was assigned to ETRA
 - Status: completed
- D1.4.3.2 / D1.4.6.1 → Were going to be combined and assigned to ETRA
 - Status: ongoing
- D1.4.4.1 → Was assigned to ETRA
 - Status: completed
- D1.4.4.2 → Was assigned to ETRA
 - Status: ongoing
- D1.4.5.1 → Was assigned to DITS
 - Status completed
- D1.4.5.2 → Was assigned to DITS
 - Status completed
- D1.4.7.1 → Was assigned to ETRA
 - Status completed

3.1 Deviations from the initial plans

As mentioned in the previous section some delays have taken place in WP1.4. In order to explain the deviations from the initial plans caused by these delays, we will split the deviations into technical and administrative issues.

Regarding the technical issues, minor deviations from the initial plans have been identified in the first stretch of the demonstrator (University – Ribalta park). The construction of the infrastructure should have been finished and ready for operation by the beginning of 2008, but in fact the system was ready for operation June 2008 and its first stretch (University – Parc Ribalta) has been opened to the public since that date.

This 6 months delay was caused mainly due to the delay in constructing the bridge over the river “Riu Sec” which construction time was underestimated.



Fig.7 “Riu Sec” Bridge in Castellón Demonstrator

The following figure shows the actual implementation schedule for the Castellón demonstrator stretch which is now in operation:

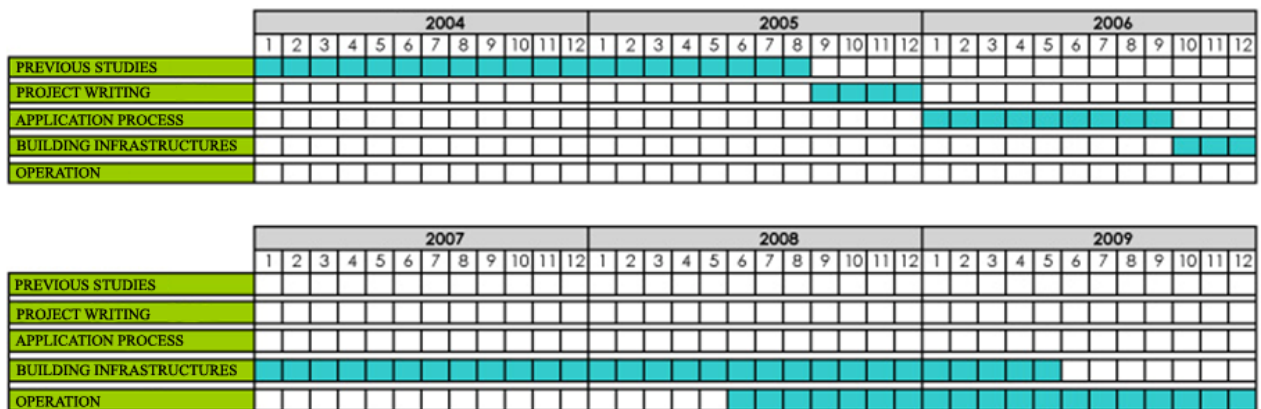


Fig.8 Actual implementation schedule for Castellón Demonstrator

The stretch of the demonstrator running across the Ribalta park has suffered a more noticeable delay mainly due to two main issues:

- When the construction began in the Ribata park some archaeological remains were found. These archaeological findings made necessary to stop the constructions work for a long time while the remains were studied and evaluated to check their value and make a new plan on how to proceed with the works.
- Some environmentalist groups were against the construction of the system through the park and several demonstrations and legal actions were planned to stop the works, these also caused some delays for a while.

These two issues caused a big delay in the construction of this stretch. The time schedule followed in the construction of the transport system in the Ribalta park can be seen in the following picture.

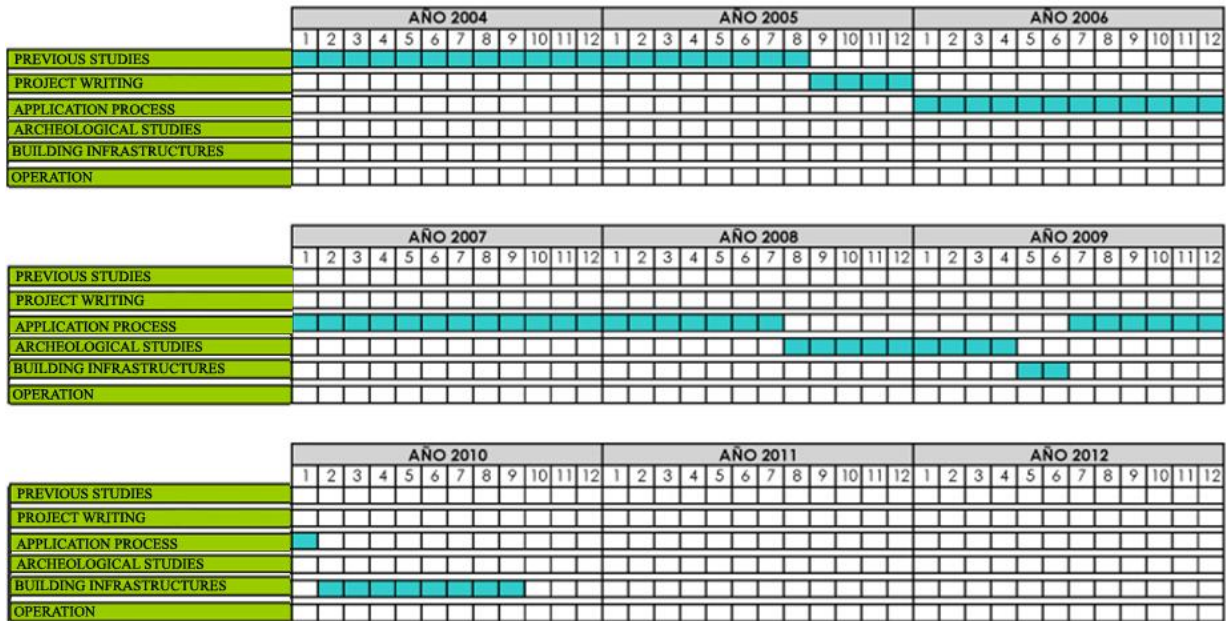


Fig.9 Actual implementation schedule for Castellón Demonstrator – Ribalta park -

As far as we know – news coming from the local papers - the stretch of the system going through Ribalta park was inaugurated in September 2010.

On the other hand and when it comes to the administrative issues and the completion of the deliverables, the delays have been more noticeable.

Furthermore, ETRA, as coordinator of the demonstrator, together with ENQ detected a risk affecting directly the work of ENQ in WP1.4. One of the main duties assigned to ENQ was the design, development and installation of the new IT services to be implemented in the system of Castellón demonstrator. The services were defined and developed by ENQ in close collaboration with GVA, but at a certain point it became clear that the possibility of these new IT services not being able to be demonstrated on Castellón was very high. In accordance with the Board members, these services were demonstrated in Trondheim CityMobil showcase instead – see next section for further information - .

4 Corrective actions taken by the consortium

The consortium has taken several corrective actions to try to sort out the administrative delays in WP1.4.

- ETRA, as coordinator of the Castellón demonstrator, as well as many other members of the CityMobil consortium, including the coordinator, tried to contact the GVA periodically to try to resume the normal activities of the work package.
- Two official letters were sent to the GVA (March 2008 and June 2008)
- Two technical visits to the large demonstration in Castellón were organized by the EC reviewer Michael Glotz-Richter (31st October 2008 and 26th of October 2009)
- During the last technical meeting to the site it was agreed that the remaining GVA budget was going to be shifted from the GVA to other partners of the consortium in order for them to cover the expenses of producing the pending deliverables. This was approved by the Board members on the SP1/Board meeting on June 2009. As a result of this it was agreed that the pending documents were going to be assigned to ETRA and DITS with the following distribution:

- D1.4.1.2 / D1.4.1.3/ D1.4.1.4 → Where going to be combined into one document and assigned to ETRA
 - D1.4.2.1 → Was assigned to ETRA
 - D1.4.2.2 → Was assigned to ETRA
 - D1.4.3.2 / D1.4.6.1 → Were going to be combined and assigned to ETRA
 - D1.4.4.1 → Was assigned to ETRA
 - D1.4.4.2 → Was assigned to ETRA
 - D1.4.5.1 → Was assigned to DITS
 - D1.4.5.2 → Was assigned to DITS
 - D1.4.7.1 → Was assigned to ETRA
- The GVA appointed two new contact persons, from one of its subcontractor companies, in charge of forwarding the necessary information from the GVA to the consortium.

In parallel to these, the consortium also took some other actions in order to be able to demonstrate the prototypes developed by ENQ in WP1.4, outside Castellón demonstrator.

- ETRA, together with ENQ, proposed to shift the responsibilities and the remaining budget from ENQ to ETRA. The reason for this was that ETRA would be in a much better position than ENQ to offer the prototypes and systems developed to other sites/showcases in the project.
- After this proposal was approved by the Board members, ETRA overtook the responsibilities of ENQ in WP1.4 and transferred the resources to WP4.3 where the proposed prototypes were finalized.
- The prototypes developed by ENQ and ETRA were demonstrated by ETRA in Trondheim Showcase instead Castellón.

5 Current status and next steps

5.1.1 Status of the Castellón Demonstration.

The Castellón demonstrator is in operation since June 2008 with good operational results and only minor day to day issues which are solved efficiently on the way.

The ex-post data has been recently analysed and reported in document D1.4.5.3: Ex-post impact assessment of the Castellon demonstration. The collection process has been done in the Castellón demonstrator by ETRA with the explicit consent of the GVA.

The data collection plan was designed and reported in the deliverable D1.4.5.1 which showed the different indicators to be measured in Castellón and how to analyse them.

To be compliant with the data collection plan three different questionnaires were developed and several surveys and phone interviews were collected between February 16th and February 26th, including the weekend – to recover ex-post data from all kind of people and not only students-

During this 10 days period the following data was collected:

- 91 users' questionnaires.
- 3 drivers' questionnaires.
- 300 phone interview questionnaires.

As far as we know – news coming from the regional papers - the Ribalta park stretch was inaugurated in September 2010. This stretch is apparently opened to the public and is being served by an electric minibus.



Fig.10 Ribalta park stretch of Citymobil Demonstrator

5.1.2 Comparison with time schedule and next steps

As explained in the previous sections, the administrative work in WP1.4 has suffered strong delays. As a result of this two WP1.4 deliverables are still under development. ETRA is developing the pending deliverables.